#### **Product Information**

Aug 2020

# Ultraform® W 2320 003 PRO AT Polyoxymethylene (POM)



## **Product Description**

Ultraform W 2320 003 PRO AT is a very easy flowing and rapidly freezing injection molding POM grade. This grade was developed for the medical device market. This grade complies with US Pharmacopoeia: Biological Reactivity Tests, USP Plastic Class VI (USP VI), ISO 10993-5: Biological Evaluation of Medical Devices Part 5: Test for Cytotoxicity, DMF: A Drug Master File (DMF) has been registered at FDA for Ultraform® PRO and Food Contact: Ultraform® PRO is in compliance with multiple regional food contact regulations, especially for Europe and United States.

### **Applications**

Typical applications include functional parts in medical devices.

Mold Shrinkage, parallel, %         294-4         2.1           Mold Shrinkage, normal, %         62           (50% RH)         0.2           (5aturation)         0.8           RHEOLOGICAL         ISO Test Method         Property Value           Melt Volume Rate (190 C/2.16 Kg), cc/10min.         1133         25           MECHANICAL         ISO Test Method         Property Value           Tensile Modulus, MPa         527         2.850           Tensile stress at yield, MPa         527         2.850           Tensile strain at yield, %         527         23C           Tensile strain at break, %         527         8           Nominal strain at break, %         527         23C           23C         24         24           Tensile Creep Modulus (1000h), MPa         899         1,350           IMPACT         ISO Test Method         Property Value           Izod Notched Impact, kJ/m²         180         5           -30C         5         5           23C         5         5           Charpy Notched, kJ/m²         179         -30C           -30C         4         4           23C         4.5           Charpy Unnotched, kJ/m²	PHYSICAL	ISO Test Method	Property Value
Mold Shrinkage, normal, %         294-4         2.1           Moisture, %         62           (50% RH)         0.2           (Saturation)         0.8           RHEOLOGICAL         ISO Test Method         Property Value           Melt Volume Rate (190 C/2.16 Kg), cc/10min.         1133         25           MECHANICAL         ISO Test Method         Property Value           Tensile Modulus, MPa         527         2350           23C         2,850         65           Tensile strain at yield, MPa         527         23C           23C         65         65           Tensile strain at break, %         527         23C           23C         24         8           Nominal strain at break, %         527         24           23C         24         1350           IMPACT         ISO Test Method         Property Value           Izod Notched Impact, kJ/m²         180         5           -30C         5         5           23C         5         5           Charpy Notched, kJ/m²         179         4           -30C         4.5         5           Charpy Unnotched, kJ/m²         179         190 <td>Density, g/cm³</td> <td>1183</td> <td>1.41</td>	Density, g/cm³	1183	1.41
Moisture, %       62         (50% RH)       0.2         (Saturation)       0.8         RHEOLOGICAL       ISO Test Method       Property Value         Melt Volume Rate (190 C/2.16 Kg), cc/10min.       1133       25         MECHANICAL       ISO Test Method       Property Value         Tensile Modulus, MPa       527       2,850         23C       2,850       65         Tensile stress at yield, MPa       527       23C         23C       65       65         Tensile strain at yield, %       527       23C         23C       8       8         Nominal strain at break, %       527       24         23C       24       Tensile Creep Modulus (1000h), MPa       899       1,350         IMPACT       ISO Test Method       Property Value         Izod Notched Impact, kJ/m²       180       5         -30C       5       5         23C       4       5         Charpy Notched, kJ/m²       179       4         -30C       4       4         23C       4.5       5         Charpy Unnotched, kJ/m²       179       190         23C       190       190 </td <td>Mold Shrinkage, parallel, %</td> <td>294-4</td> <td>2</td>	Mold Shrinkage, parallel, %	294-4	2
(50% RH) (Saturation) (Saturation) (Saturation) (Saturation) (SO Test Method Property Value Melt Volume Rate (190 C/2.16 Kg), cc/10min. 1133 25 MECHANICAL ISO Test Method Property Value  Melt Volume Rate (190 C/2.16 Kg), cc/10min. 1133 25 MECHANICAL ISO Test Method Property Value  Tensile Modulus, MPa 527 23C 2,850 Tensile stress at yield, MPa 527 23C 65 Tensile strain at yield, % 527 23C 8 Nominal strain at break, % 527 23C 24 Tensile Creep Modulus (1000h), MPa 899 1,350 IMPACT ISO Test Method Property Value  Izod Notched Impact, kJ/m² 180 -30C 5 23C 5 Charpy Notched, kJ/m² 179 -30C 4 23C 7 24C 7 2	Mold Shrinkage, normal, %	294-4	2.1
(Saturation)         0.8           RHEOLOGICAL         ISO Test Method         Property Value           Melt Volume Rate (190 C/2.16 Kg), cc/10min.         1133         25           MECHANICAL         ISO Test Method         Property Value           Tensile Modulus, MPa         527         2,850           23C         2,850         2           Tensile stress at yield, MPa         527         23C         65           Tensile strain at yield, %         527         8         8           Nominal strain at break, %         527         24         8           23C         24         1,350         1           IMPACT         ISO Test Method         Property Value           Izod Notched Impact, kJ/m²         180         5           -30C         5         5           23C         5         5           Charpy Notched, kJ/m²         179         4           -30C         4         5           23C         4.5         5           Charpy Unnotched, kJ/m²         179         9           -30C         190         190           23C         190         190           23C         190         190 <td>Moisture, %</td> <td>62</td> <td></td>	Moisture, %	62	
RHEOLOGICAL         ISO Test Method         Property Value           Melt Volume Rate (190 C/2.16 Kg), cc/10min.         1133         25           MECHANICAL         ISO Test Method         Property Value           Tensile Modulus, MPa         527           23C         2,850           Tensile stress at yield, MPa         527           23C         65           Tensile strain at yield, %         527           23C         8           Nominal strain at break, %         527           23C         24           Tensile Creep Modulus (1000h), MPa         899         1,350           IMPACT         ISO Test Method         Property Value           Izod Notched Impact, kJ/m²         180         5           -30C         5         5           23C         5         5           Charpy Notched, kJ/m²         179         -30C         4           -30C         4.5         5           Charpy Unnotched, kJ/m²         179         -30C         190           -30C         190         190           23C         190         190           23C         190         190           THERMAL         ISO Test Method	(50% RH)		0.2
Melt Volume Rate (190 C/2.16 Kg), cc/10min.         1133         25           MECHANICAL         ISO Test Method         Property Value           Tensile Modulus, MPa         527           23C         2,850           Tensile stress at yield, MPa         527           23C         65           Tensile strain at yield, %         527           23C         8           Nominal strain at break, %         527           23C         24           Tensile Creep Modulus (1000h), MPa         899         1,350           IMPACT         ISO Test Method         Property Value           Izod Notched Impact, kJ/m²         180         5           -30C         5         5           23C         5         5           Charpy Notched, kJ/m²         179         4           -30C         4.5         5           Charpy Unnotched, kJ/m²         179         190           -30C         190         190           23C         190 <t< td=""><td>(Saturation)</td><td></td><td>0.8</td></t<>	(Saturation)		0.8
MECHANICAL         ISO Test Method         Property Value           Tensile Modulus, MPa         527           23C         2,850           Tensile stress at yield, MPa         527           23C         65           Tensile strain at yield, %         527           23C         8           Nominal strain at break, %         527           23C         24           Tensile Creep Modulus (1000h), MPa         899         1,350           IMPACT         ISO Test Method         Property Value           Izod Notched Impact, kJ/m²         180         5           -30C         5         5           23C         5         5           Charpy Notched, kJ/m²         179         4           -30C         4.5         5           Charpy Unnotched, kJ/m²         179         4.5           -30C         190         190           23C         190         190 <t< td=""><td>RHEOLOGICAL</td><td>ISO Test Method</td><td>Property Value</td></t<>	RHEOLOGICAL	ISO Test Method	Property Value
Tensile Modulus, MPa 527 23C 2,850  Tensile stress at yield, MPa 527 23C 65  Tensile strain at yield, % 527 23C 8  Nominal strain at break, % 527 23C 24  Tensile Creep Modulus (1000h), MPa 899 1,350  IMPACT ISO Test Method Property Value  Izod Notched Impact, kJ/m² 180 -30C 5 23C 5  Charpy Notched, kJ/m² 179 -30C 4 23C 4,5  Charpy Unnotched, kJ/m² 179 -30C 4 23C 190 23C 190 23C 190 23C 190 23C 190 24C 25C 4,5  25C 25C 4,5  Charpy Unnotched, kJ/m² 179 -30C 4 23C 7 24C 7 25C 7	Melt Volume Rate (190 C/2.16 Kg), cc/10min.	1133	25
23C       2,850         Tensile stress at yield, MPa       527         23C       65         Tensile strain at yield, %       527         23C       8         Nominal strain at break, %       527         23C       24         Tensile Creep Modulus (1000h), MPa       899       1,350         IMPACT       ISO Test Method       Property Value         Izod Notched Impact, kJ/m²       180       5         -30C       5       5         Charpy Notched, kJ/m²       179       4         -30C       4,5       5         Charpy Unnotched, kJ/m²       179       -30C       4,5         Charpy Unnotched, kJ/m²       179       -30C       190         23C       190       190         23C       190       190         23C       190       190         23C       190         23C       190         THERMAL       ISO Test Method       Property Value         Melting Point, C       3146       166	MECHANICAL	ISO Test Method	Property Value
Tensile stress at yield, MPa 527 23C 65  Tensile strain at yield, % 527 23C 8  Nominal strain at break, % 527 23C 24  Tensile Creep Modulus (1000h), MPa 899 1,350  IMPACT ISO Test Method Property Value  Izod Notched Impact, kJ/m² 180 -30C 5 23C 5  Charpy Notched, kJ/m² 179 -30C 4 23C 4 23C 4 23C 4 Ensile Creep Modulus (1000h), MPa 1899 1,350  IMPACT ISO Test Method Property Value  180 -30C 5 23C 5  Charpy Untotched, kJ/m² 179 -30C 4 23C 4 23C 190 -30C 190 -3	Tensile Modulus, MPa	527	
23C Tensile strain at yield, % 23C 23C 8 Nominal strain at break, % 527 23C 24 Tensile Creep Modulus (1000h), MPa 899 1,350  IMPACT ISO Test Method Property Value  Izod Notched Impact, kJ/m² 180 -30C 23C 5 Charpy Notched, kJ/m² 179 -30C 4 23C Charpy Unnotched, kJ/m² 179 -30C 23C Charpy Unnotched, kJ/m² 179 -30C 23C Charpy Unnotched, kJ/m² 179 -30C 23C Thermy Unnotched, kJ/m² 179 -30C 23C 190 THERMAL ISO Test Method Property Value  Melting Point, C	23C		2,850
Tensile strain at yield, % 527 23C 8  Nominal strain at break, % 527 23C 24  Tensile Creep Modulus (1000h), MPa 899 1,350  IMPACT ISO Test Method Property Value  Izod Notched Impact, kJ/m² 180 -30C 5 23C 5  Charpy Notched, kJ/m² 179 -30C 4 23C 4 23C 4.5  Charpy Unnotched, kJ/m² 179 -30C 4 23C 190 23C 190 23C 190 23C 190 THERMAL ISO Test Method Property Value	Tensile stress at yield, MPa	527	
23C Nominal strain at break, % 23C 23C 24 Tensile Creep Modulus (1000h), MPa 899 1,350  IMPACT ISO Test Method Property Value  Izod Notched Impact, kJ/m² 180 -30C -30C 5 Charpy Notched, kJ/m² 179 -30C 4 23C Charpy Unnotched, kJ/m² 179 -30C 23C Charpy Unnotched, kJ/m² 179 -30C 23C 190 THERMAL ISO Test Method Property Value  ISO Test Method Property Value  ISO Test Method Property Value	23C		65
Nominal strain at break, %   527	Tensile strain at yield, %	527	
23C       24         Tensile Creep Modulus (1000h), MPa       899       1,350         IMPACT       ISO Test Method       Property Value         Izod Notched Impact, kJ/m²       180         -30C       5         23C       5         Charpy Notched, kJ/m²       179         -30C       4         23C       4.5         Charpy Unnotched, kJ/m²       179         -30C       190         23C       190         THERMAL       ISO Test Method       Property Value         Melting Point, C       3146       166	23C		8
Tensile Creep Modulus (1000h), MPa         899         1,350           IMPACT         ISO Test Method         Property Value           Izod Notched Impact, kJ/m²         180           -30C         5           23C         5           Charpy Notched, kJ/m²         179           -30C         4           23C         4.5           Charpy Unnotched, kJ/m²         179           -30C         190           23C         190           THERMAL         ISO Test Method         Property Value           Melting Point, C         3146         166	Nominal strain at break, %	527	
IMPACT         ISO Test Method         Property Value           Izod Notched Impact, kJ/m²         180           -30C         5           23C         5           Charpy Notched, kJ/m²         179           -30C         4           23C         4.5           Charpy Unnotched, kJ/m²         179           -30C         190           23C         190           THERMAL         ISO Test Method         Property Value           Melting Point, C         3146         166	23C		24
Izod Notched Impact, kJ/m²       180         -30C       5         23C       5         Charpy Notched, kJ/m²       179         -30C       4         23C       4.5         Charpy Unnotched, kJ/m²       179         -30C       190         23C       190         THERMAL       ISO Test Method       Property Value         Melting Point, C       3146       166	Tensile Creep Modulus (1000h), MPa		1,350
-30C       5         23C       5         Charpy Notched, kJ/m²       179         -30C       4         23C       4.5         Charpy Unnotched, kJ/m²       179         -30C       190         23C       190         THERMAL       ISO Test Method       Property Value         Melting Point, C       3146       166	IMPACT	ISO Test Method	Property Value
23C       5         Charpy Notched, kJ/m²       179         -30C       4         23C       4.5         Charpy Unnotched, kJ/m²       179         -30C       190         23C       190         THERMAL       ISO Test Method       Property Value         Melting Point, C       3146       166		180	
Charpy Notched, kJ/m²       179         -30C       4         23C       4.5         Charpy Unnotched, kJ/m²       179         -30C       190         23C       190         THERMAL       ISO Test Method       Property Value         Melting Point, C       3146       166	-30C		5
-30C 4 23C 4.5 Charpy Unnotched, kJ/m² 179 -30C 190 23C 190 THERMAL ISO Test Method Property Value Melting Point, C 3146 166	23C		5
23C       4.5         Charpy Unnotched, kJ/m²       179         -30C       190         23C       190         THERMAL       ISO Test Method       Property Value         Melting Point, C       3146       166	Charpy Notched, kJ/m <sup>2</sup>	179	
Charpy Unnotched, kJ/m²       179         -30C       190         23C       190         THERMAL       ISO Test Method       Property Value         Melting Point, C       3146       166			·
-30C       190         23C       190         THERMAL       ISO Test Method       Property Value         Melting Point, C       3146       166	23C		4.5
23C  THERMAL ISO Test Method Property Value  Melting Point, C 3146 166	Charpy Unnotched, kJ/m <sup>2</sup>	179	
THERMALISO Test MethodProperty ValueMelting Point, C3146166			
Melting Point, C 3146 166			
•	THERMAL		Property Value
HDT A, C 75 100	Melting Point, C		
	HDT A, C	75	100

# Ultraform® W 2320 003 PRO AT



Coef. of Linear Thermal Expansion, Parallel, mm/mm C

1.1 X10-4

ELECTRICAL	ISO Test Method	Property Value
Comparative Tracking Index	IEC 60112	600
Volume Resistivity (Ohm-m)	IEC 60093	1E11
Surface Resistivity (Ohm)	IEC 60093	1E13
Dielectric Constant (1 MHz)	IEC 60250	3.8
Dissipation Factor (1 MHz), E-4	IEC 60250	50

## **Processing Guidelines**

#### **Material Handling**

Max. Water content: 0.15%

Product is supplied in polyethylene bags and drying prior to molding is not required. However, after relatively long storage or when handling material from previously opened containers, preliminary drying is recommended in order to remove any moisture which has been absorbed. If drying is required, a dehumidifying or desiccant dryer operating at 80 - 110C (176 - 230F) is recommended. Drying time is dependent on moisture level, however 2-4 hours is generally sufficient. Further information concerning safe handling procedures can be obtained from the Safety Data Sheet. Alternatively, please contact your BASF representative.

#### **Typical Profile**

Melt Temperature 190-230C (375-446F) Mold Temperature 60-120C (140-248F) Injection and Packing Pressure 35-70 bar (500-1000psi)

#### **Mold Temperatures**

A mold temperature of 60-120C (140-248F) is recommended, however temperatures of as low as 45C (113F) can be used where applicable.

#### **Pressures**

Injection speed must be optimized. A filling rate which is too high results in anisotropic mechanical properties, while a filling rate which is too low yields parts with poor surface finish. The tool must be vented to avoid burn marks and prevent mold deposits. Injection pressure controls the filling of the part and should be applied for 90% of ram travel. Packing pressure affects the final part and can be used effectively in controlling sink marks and shrinkage. It should be applied and maintained until the gate area is completely frozen off.

Back pressure can be utilized to provide uniform melt consistency and reduce trapped air and gas.

## Fill Rate

Injection speed must be optimized. A filling rate which is too high results in anisotropic mechanical properties, while a filling rate which is too low yields parts with poor surface finish. The tool must be vented to avoid burn marks and prevent mold deposits.

#### Note

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